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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/576,107

04/18/2006

Kiminori Mizuuchi

2006_0568A

1714

52349

7590

05/01/2008

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EXAMINER

HAGAN, SEAN P

ART UNIT

PAPER NUMBER

2828

MAIL DATE

DELIVERY MODE

05/01/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/576,107	Applicant(s) MIZUUCHI ET AL.	
	Examiner SEAN HAGAN	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 February 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 23-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2008 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>11 December 2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1 through 21 originally filed 18 April 2006. Claims 1 through 21 cancelled by preliminary amendment. Claims 22 through 45 added by preliminary amendment. Claim 22 cancelled by amendment received 12 February 2008. Claims 46 through 49 added by amendment received 12 February 2008. Claims 23, 24, 26 through 32, 34 through 36, 38, 39, and 43 amended by amendment received 12 February 2008. Claims 23 through 49 are pending in this application.

Specification

2. The amendment filed 12 February 2008 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: Line 3 of page 10 amends previously presented sentence reading "0.2nm or less is even better" to read "A wavelength of 0.2nm or less is even better." This has no support in the previous specification due to the particular line referring to a bandwidth and not a wavelength.

3. Applicant is required to cancel the new matter in the reply to this Office Action.

Drawings

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the

description: "612". Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Response to Arguments

5. Applicant's arguments have been fully considered but they are not persuasive.
6. Regarding applicant's argument that Bischel et al. (Bischel, US Patent 5,499,256) does not teach the limitation "A wide stripe semiconductor laser capable of exciting a plurality of lateral modes", this does not appear to be the case. As demonstrated by applicant's arguments present on page 19 of applicant's presently filed amendment (APFA), one of the problems with implementing reflection gratings in a wide stripe semiconductor laser (which applicant has admitted is present within Bischel on page 15 of APFA) is that such reflection structures become incapable of proper oscillation due to a predilection of such lasers to operate in transverse multimode. This

is supported by the invention of Bischel which appears to function with the specific desired function of confining a wide stripe laser to a single transverse mode (Bischel, col. 5, lines 6-21). As such, it appears to be inherent that any wide stripe laser would be capable of exciting a plurality of lateral modes. As Bischel discloses utilization of a wide stripe laser, argument that the laser implemented by Bischel is incapable of supporting a plurality of lateral modes is not persuasive.

7. Regarding argument that Bischel fails to meet the limitations “A wavelength selecting filter through which light exciting an end face of the single-mode wavelength passes” and “Through which a portion of the light transmitted by the single-mode waveguide is fed back to an active layer of the semiconductor laser using the same exit path” these limitations appear to be related to applicant's argument present in the first full paragraph on page 20 in APFA relating to how the instant application presents wavelength selection in that “the angle of the narrow-band filter is changed in order to change the wavelength of transparency”. Bischel does not appear to perform this function; however this specific function does not appear present in any limitation of the present invention. In contrast, the claim limitations merely designate a wavelength selecting filter and make no requirements on how such wavelength selection is to come about. As noted on page 20 in APFA, Bischel does disclose an “arrangement used for frequency stabilization and selection.” The arrangements fitting this description within the various embodiments of Bischel appear to be located in the correct areas to meet

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the claim limitation. Accordingly, argument that this limitation is not met is not persuasive.

8. Regarding argument that the limitation that "Wherein an oscillation mode of the semiconductor laser is limited by the light that has been fed back so that the semiconductor laser oscillates in a generally single longitudinal mode and generally single lateral mode", applicant's argument that this limitation is not met appears to cite Bischel teaching this limitation. Applicant's state at least in page 20 of APFA that "Since the waveguide segment 440 supports only a single transverse optical mode, all other possible spatial modes that are supported by the wide multi-mode gain region 410 have significant loss and will not reach lasing threshold in a properly designed system." This excerpt is cited from Bischel, column 18, lines 19 through 44. Applicants appear to be arguing from the perspective that a single longitudinal mode is one mode and a single transverse mode is another mode. These are operating conditions for a coherent light beam. A single longitudinal mode means that the light source presents only a single spot in the longitudinal direction. A single transverse mode means that the light source presents only a single spot in the transverse direction. Bischel discloses an external cavity laser which meets the criteria for controlling laser oscillation according to a portion fed back to the laser (while the remainder is released as output). The only way Bischel would be unable to meet this claim is if either the transverse mode or the longitudinal mode operated in multi-mode. As noted in Bischel, column 22, lines 19 through 26, this is not the case. As such, these claim limitations are deemed to be met.

9. Regarding inclusion of a periodic polarization inversion region included within the present invention and the stringent requirements thereof. In column 9, lines 41 through 55 of Bischel is previously cited regarding related limitations and explicitly introduces a periodically poled structure so as to cause a frequency conversion. Arguments that such a structure is not sufficiently disclosed are not persuasive.

10. Regarding the arguments relating to a Bragg reflection structure located within the semiconductor laser, column 17, lines 28 through 31 of Bischel dictate that the reflection structure of Bischel abutted to the semiconductor laser may, among other things, be a reflection grating. Arguments that limitations drawn to this feature are not met are not persuasive.

11. Accordingly, all claims are addressed as follows:

Claim Rejections - 35 USC § 102

12. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

13. Claims 22, 23, 24, 25, 29, 31, 32, 33, 34, 35, 36, 38, 42, and 46 rejected under 35 U.S.C. 102(b) as being anticipated over Bischel.

14. ***Regarding claim 23***, Bischel discloses, "A wide stripe semiconductor laser capable of exciting a plurality of lateral modes" (col. 17, lines 23-25). "A mode

converter for beam shaping therein light emitted from the semiconductor laser" (col. 17, lines 40-45). "A single-mode waveguide to which the light from the semiconductor laser is coupled through the mode converter" (col. 18, lines 30-35). "A wavelength selecting filter through which light exciting an end face of the single-mode wavelength passes" (col. 22, lines 26-29). "Through which a portion of the light transmitted by the single-mode waveguide is fed back to an active layer of the semiconductor laser using the same exit path" (Fig. 10, pts. 410, 412, 624, and 630). "Wherein an oscillation mode of the semiconductor laser is limited by the light that has been fed back" (col. 17, lines 40-55). "So that the semiconductor laser oscillates in a generally single longitudinal mode and generally single lateral mode" (col. 22, lines 19-26). "Wherein the portion of the light coupled to the single-mode waveguide is also reflected at the end face of the single-mode waveguide and fed back to the active layer of the semiconductor laser" (col. 17, lines 40-55).

15. **Regarding claim 24**, Bischel discloses, "A wide stripe semiconductor laser capable of exciting a plurality of lateral modes" (col. 17, lines 23-25). "A mode converter for beam shaping therein light emitted from the semiconductor laser" (col. 17, lines 40-45). "A single-mode waveguide to which the light from the semiconductor laser is coupled through the mode converter" (col. 18, lines 30-35). "A wavelength selecting filter through which light exciting an end face of the single-mode wavelength passes" (col. 22, lines 26-29). "Through which a portion of the light transmitted by the single-mode waveguide is fed back to an active layer of the semiconductor laser using the

same exit path" (Fig. 10, pts. 410, 412, 624, and 630). "Wherein the oscillation mode of the semiconductor laser is limited by the light that has been fed back" (col. 17, lines 40-55). "So that the semiconductor laser oscillates in a generally single longitudinal mode and generally single lateral mode" (col. 22, lines 19-26). "Wherein the wavelength selecting filter includes a band pass filter and a reflector" (col. 21, lines 14-25). "The light that has been transmitted by the single-mode waveguide passes through the band pass filter" (col. 21, lines 14-25). "Then the portion of the light that has been fed back through the wavelength selecting filter is reflected by the reflector and fed back to the active layer of the semiconductor laser" (col. 17, lines 40-55).

16. **Regarding claim 25**, Bischel discloses, "Wherein the band pass filter and the reflector are formed integrally with the single-mode waveguide as a Bragg reflection grating" (col. 21, lines 14-25).

17. **Regarding claim 29**, Bischel discloses, "Wherein the mode converter is a tapered waveguide" (Fig. 8).

18. **Regarding claim 31**, Bischel discloses, "A wide stripe semiconductor laser capable of exciting a plurality of lateral modes" (col. 17, lines 23-25). "A single-mode waveguide to which light exiting the semiconductor laser is coupled" (col. 17, lines 40-45). "Having a periodic polarization inversion structure" (col. 9, lines 38-56). "A wavelength selecting filter through which the light exiting an end face of a single-mode

waveguide passes" (col. 17, lines 23-25). "Through which a portion of the light transmitted by the single-mode waveguide is fed back to an active layer of the semiconductor laser using the same exit path" (Fig. 10, pts. 410, 412, 624, and 630). "Wherein the oscillation mode of the semiconductor laser is limited by the light that has been fed back" (col. 17, lines 40-55). "So that the semiconductor laser oscillates in a generally single longitudinal mode and is a generally single lateral mode" (col. 22, lines 19-26). "Wherein the portion of the light that passes from the semiconductor laser through the single-mode waveguide is subjected to wavelength conversion by the polarization inversion structure" (col. 9, lines 38-56).

19. **Regarding claim 32**, Bischel discloses, "A wide stripe semiconductor laser capable of exciting a plurality of lateral modes" (col. 17, lines 23-25). "A tapered waveguide having an incident end face to which light exiting from the semiconductor laser is coupled" (Fig. 8). "A single-mode waveguide formed on the end face side of the tapered waveguide" (col. 18, lines 30-35). "A band pass filter through which a portion of the light transmitted by the single-mode waveguide passes" (col. 21, lines 14-25). "A reflector that reflects the light transmitted through the band pass filter and feeds the portion of the light back to an active layer of the semiconductor laser using the same exit path" (col. 21, lines 14-25). "Wherein the oscillation mode of the semiconductor laser is limited by the light that has been fed back" (col. 17, lines 40-55). "So that the semiconductor laser oscillates in a generally single longitudinal mode and a generally single lateral mode" (col. 22, lines 19-26).

20. **Regarding claim 33**, Bischel discloses, "Wherein the band pass filter is formed integrally with the single-mode waveguide as a Bragg reflection grating" (col. 21, lines 14-25).

21. **Regarding claim 34**, Bischel discloses, "Wherein the single-mode waveguide is composed of a nonlinear optical material and has a periodic polarization inversion structure" (col. 9, lines 38-56). "A portion of the light from the semiconductor laser is subjected to wavelength conversion by the polarization inversion structure" (col. 9, lines 38-56).

22. **Regarding claim 35**, Bischel discloses, "A wide stripe semiconductor laser capable of exciting a plurality of lateral modes" (col. 17, lines 23-25). "Including a Bragg reflection grating" (col. 17, lines 23-25). "A tapered waveguide having an incident end face to which light from the semiconductor laser is coupled" (Fig. 8). "A single-mode waveguide formed on the exit end face side of the tapered waveguide" (col. 18, lines 30-35). "A reflector that reflects a portion of the light transmitted from the single-mode waveguide and feeds the portion of the light back to an active layer of the semiconductor laser using the same exit path" (col. 21, lines 14-25). "Wherein the oscillation mode of the semiconductor laser is limited by the light that has been fed back" (col. 17, lines 40-55). "So that the semiconductor laser oscillates in a generally single longitudinal mode and a generally single lateral mode" (col. 22, lines 19-26).

23. **Regarding claim 36**, Bischel discloses, "Wherein the single-mode waveguide is composed of a nonlinear optical material and has a periodic polarization inversion structure" (col. 9, lines 38-56). "A portion of the light from the semiconductor laser is subjected to wavelength conversion by the polarization inversion structure" (col. 9, lines 38-56).

24. **Regarding claim 38**, Bischel discloses, "Wherein the lateral mode of the semiconductor laser is substantially fixed to single-mode oscillation by feedback light" (col. 17, lines 40-55).

25. **Regarding claim 42**, Bischel discloses, "Wherein the lateral mode of the semiconductor laser is substantially fixed to single-mode oscillation by feedback light" (col. 17, lines 40-55).

26. **Regarding claim 46**, Bischel discloses, "Wherein the lateral mode of the semiconductor laser is substantially fixed to single-mode oscillation by feedback light" (col. 17, lines 40-55).

Claim Rejections - 35 USC § 103

27. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

28. Claims 26, 27, 28, and 30 rejected under 35 U.S.C. 103(a) as being unpatentable over Bischel.

29. **Regarding claim 26**, Bischel does not disclose, "Wherein the wavelength selecting filter is constituted by a volume grating." It would have been obvious to one of ordinary skill in the art at the time of invention to use a volume grating since it was known in the art that a volume grating may advantageously be utilized in cases where it is desirable to have a wavelength selective reflector.

30. **Regarding claim 27**, Bischel does not disclose, "Wherein the wavelength selecting filter is a fiber grating." It would have been obvious to one of ordinary skill in the art at the time of invention to use a fiber grating since it was known in the art that a fiber grating may advantageously be utilized in cases where it is desirable to have a wavelength selective reflector.

31. **Regarding claim 28**, Bischel does not disclose, "Wherein the wavelength selecting filter is formed integrally with the semiconductor laser as a Bragg reflection grating." It would have been obvious to one of ordinary skill in the art to integrate Bragg grating with semiconductor laser, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70.

32. **Regarding claim 30**, Bischel does not disclose, "Wherein the mode converter is a tapered fiber." It would have been an obvious matter of design choice to use a tapered fiber, since applicant has not disclosed that this difference solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with a tapered waveguide.

33. Claims 37 rejected under 35 U.S.C. 103(a) as being unpatentable over Bischel in view of Arnone et al. (Arnone, US Patent 6,388,799).

34. **Regarding claim 37**, Bischel does not disclose, "Wherein the exit end face of the single-mode waveguide has a dichroic mirror that transmits fundamental waves and transmits higher harmonic waves." Arnone discloses, "Wherein the exit end face of the single-mode waveguide has a dichroic mirror that transmits fundamental waves and transmits higher harmonic waves" (col. 21, lines 32-34). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Bischel with the teachings of Arnone. The dichroic mirror of Arnone would enhance the teachings of Bischel by allowing wavelength selective outcoupling.

35. Claims 39, 40, 41, 43, 44, 45, 47, 48, and 49 rejected under 35 U.S.C. 103(a) as being unpatentable over Bischel in view of Brodsky et al. (Brodsky, US Patent 6,489,985).

36. **Regarding claim 39**, Bischel does not disclose, "Wherein the light from the coherent light source is converted by the optical system into a two-dimensional image." Brodsky discloses, "Wherein the light from the coherent light source is converted by the optical system into a two-dimensional image" (col. 10, lines 17-46). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Bischel with the teachings of Brodsky. The optical system of Brodsky would have been a suitable use for the laser system of Bischel.

37. **Regarding claim 40**, Bischel does not disclose, "Wherein the image conversion optical system has a two-dimensional beam scanning optical system." Brodsky discloses, "Wherein the image conversion optical system has a two-dimensional beam scanning optical system" (col. 10, lines 17-46). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Bischel with the teachings of Brodsky for the reasons given above regarding claim 39.

38. **Regarding claim 41**, Bischel does not disclose, "Wherein the image conversion optical system has a two-dimensional switch." It would have been an obvious matter of design choice to include a two-dimensional optical switch, since applicant has not disclosed that this difference solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with standard scanning means.

39. **Regarding claim 43**, Bischel does not disclose, "Wherein the light from the coherent light source is converted by the optical system into a two-dimensional image." Brodsky discloses, "Wherein the light from the coherent light source is converted by the optical system into a two-dimensional image" (col. 10, lines 17-46). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Bischel with the teachings of Brodsky for the reasons given above regarding claim 39.

40. **Regarding claim 44**, Bischel does not disclose, "Wherein the image conversion optical system has a two-dimensional beam scanning optical system." Brodsky discloses, "Wherein the image conversion optical system has a two-dimensional beam scanning optical system" (col. 10, lines 17-46). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Bischel with the teachings of Brodsky for the reasons given above regarding claim 39.

41. **Regarding claim 45**, Bischel does not disclose, "Wherein the image conversion optical system has a two-dimensional switch." It would have been an obvious matter of design choice to include a two-dimensional optical switch, since applicant has not disclosed that this difference solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with standard scanning means.

42. **Regarding claim 47**, Bischel does not disclose, "Wherein the light from the coherent source is converted by the optical system into a two-dimensional image." Brodsky discloses, "Wherein the light from the coherent source is converted by the optical system into a two-dimensional image" (col. 10, lines 17-46). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Bischel with the teachings of Brodsky for the reasons given above regarding claim 39.

43. **Regarding claim 48**, Bischel does not disclose, "Wherein the image conversion optical system has a two-dimensional beam scanning optical system." Brodsky discloses, "Wherein the image conversion optical system has a two-dimensional beam scanning optical system" (col. 10, lines 17-46). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Bischel with the teachings of Brodsky for the reasons given above regarding claim 39.

44. **Regarding claim 49**, Bischel does not disclose, "Wherein the image conversion optical system has a two-dimensional switch." It would have been an obvious matter of design choice to include a two-dimensional optical switch, since applicant has not disclosed that this difference solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with standard scanning means.

Conclusion

45. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

46. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

47. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SEAN HAGAN whose telephone number is (571)270-1242. The examiner can normally be reached on Monday-Friday 7:30 - 5:00.

48. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun O. Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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49. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. H./

Examiner, Art Unit 2828

/Minsun Harvey/

Supervisory Patent Examiner, Art Unit 2828